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(54) COATING COMPOSITION

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a coating composition capable of forming cured film excellent in abrasion resistance, adhesiveness, heat resistance, etc.

SOLUTION: This coating composition comprises (A) an alkoxy group- containing silane-modified epoxy resin obtained by carrying out dealcoholization reaction of (1) a bisphenol type epoxy resin with (2) an alkoxysilane partial condensation product, (B) a bisphenol type epoxy resin and (C) a curing agent for epoxy resins.

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CLAIMS

[Claim(s)]

[Claim 1] The coating constituent characterized by consisting of a curing agent for an alkoxy group content silane modified epoxy resin (A), a bisphenol mold epoxy resin (B), and epoxy resins (C) which is made to carry out the dealcoholization reaction of a bisphenol mold epoxy resin (1) and the alkoxysilane partial condensate (2), and is obtained.

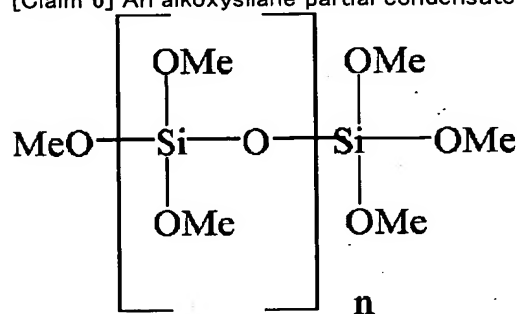
[Claim 2] The coating constituent according to claim 1 which comes to contain a solvent (D) and/or a filler (E).

[Claim 3] The coating constituent according to claim 1 or 2 whose functional group in which a filler has active hydrogen in the curing agent for epoxy resins (C) to 1Eq of epoxy groups which a bisphenol mold epoxy resin (B) is the 50 - 500 weight section, and the blending ratio of coal of said constituent is the 0 - 500 weight section to the hardening residue 100 weight section of an alkoxy group content silane modified epoxy resin (A), and originate in an alkoxy group content silane modified epoxy resin (A) and a bisphenol mold epoxy resin (B) is 0.5-1.2Eq.

[Claim 4] The coating constituent according to claim 1 to 3 whose bisphenol mold epoxy resin (1) is the bisphenol A mold epoxy resin of weight per epoxy equivalent 180 - 1500 g/eq.

[Claim 5] An alkoxysilane partial condensate (2) is general formula: $R_1pSi(OR_2)_{4-p}$ (p shows the integer of 0 or 1 among a formula.). R_1 shows the low-grade alkyl group which may have a functional group linking directly to a carbon atom, an aryl group, or partial saturation aliphatic series residue, and even if respectively the same, it may differ. Moreover, R_2 shows a hydrogen atom or a low-grade alkyl group. Coating constituent according to claim 1 to 4 which is a partial condensate of the compound expressed.

[Claim 6] An alkoxysilane partial condensate (2) is a general formula [** 1].



It is the coating constituent according to claim 5 which is a partial condensate of the tetramethoxy silane expressed with (Me shows a methyl group among a formula and the average repeat numbers of unit of n are 1-7).

[Claim 7] The coating constituent according to claim 1 to 6 the range of whose alkoxy group content silane modified epoxy resin (A) is 0.01-3 by the weight (weight ratio) of the silica equivalent weight / bisphenol mold epoxy resin (1) of an alkoxysilane partial condensate (2).

[Claim 8] The coating constituent according to claim 1 to 7 the range of whose operating rate of a bisphenol mold epoxy resin (1) and an alkoxysilane partial condensate (2) is 1 / 30 - 1/3 in the equivalent (equivalent ratio) of the alkoxy group of the equivalent / alkoxysilane partial condensate (2) of the hydroxyl group of a bisphenol mold epoxy resin (1).

[Claim 9] The coating constituent according to claim 1 to 8 which is the thing to which an alkoxy group content silane modified epoxy resin (A) comes to react on anhydrous conditions substantially.

[Claim 10] The coating constituent according to claim 1 to 9 whose bisphenol mold epoxy resin (B) is the bisphenol A mold epoxy resin of weight per epoxy equivalent 180 - 2200 g/eq.

[Claim 11] The coating constituent according to claim 1 to 10 which is at least one sort chosen from the group which the curing agent for epoxy resins (C) becomes from a phenol resin system, a polyamine system, and a polycarboxylic acid system curing agent.

[Claim 12] The coating constituent according to claim 1 to 11 whose solvent (D) is except water.

[Claim 13] The coating constituent according to claim 1 to 12 which is at least one sort as which a printed base material is chosen from an inorganic base material.

[Claim 14] The coating constituent according to claim 13 whose inorganic base material is concrete, mortar, or glass.

[Claim 15] The coating constituent according to claim 13 whose inorganic base material is a metal.

[Claim 16] The coating constituent according to claim 15 whose metal is aluminum, a galvanized steel sheet, a tinning steel plate, or a Magnesium alloy.

[Claim 17] The coating constituent according to claim 1 to 16 which is a primer for inorganic base materials.

[Claim 18] The coating constituent according to claim 17 which is a printing mold or a constituent for 1 liquid hardening mold coatings of ordinary temperature latency.

[Claim 19] The coating constituent according to claim 17 which is a constituent for 2 liquid hardening mold coatings.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a coating constituent. The coating constituent of this invention can be used as a coating material to various base materials. It is especially suitable as the coating agent to various inorganic base materials, such as glass, mortar, cement, and aluminum, a galvanization plate, a Magnesium alloy, a primer, a sealing agent, etc.

[0002]

[Description of the Prior Art] The bisphenol mold epoxy resin manufactured from bisphenols, epichlorohydrin, or beta-methyl epichlorohydrin originates in the reactivity of the epoxy group in this resin, and a hydroxyl group, and a water resisting property, adhesion, chemical resistance, etc. are excellent, and it is used widely as various coating agents. Moreover, generally the object for prizes of the epoxy resin has been carried out in broad fields, such as a coating agent, a coating, and a sealer, by the gestalt of the epoxy resin constituent combined with the curing agent, or its hardened material. However, with an advancement and complication of an operating environment, the advanced engine performance is required and improvement in thermal resistance or base material adhesion is desired especially in recent years.

[0003] As an approach of raising the thermal resistance of an epoxy resin hardened material, the approach of mixing fillers, such as a glass fiber, a glass particle, and a mica, is in the constituent which consists of an epoxy resin and a curing agent, for example. However, by this approach, it is not obtained and the transparency of an epoxy resin hardened material is easy to be lost, the adhesive property of the interface of a filler and resin is further inferior, or sufficient thermal resistance becomes insufficient [mechanical properties, such as an elastic modulus of a hardened material,].

[0004] This invention relates to a suitable coating constituent to the coating constituent excellent in abrasion resistance, adhesion, thermal resistance, etc., especially non-element material and a nonferrous metal. The coating constituent of this invention is suitable for various applications, such as 1 liquid or 2 liquid type primer coating, a sealing agent, and adhesives.

[0005]

[Problem(s) to be Solved by the Invention] This invention aims at offering the coating constituent which can form the hardening film excellent in abrasion resistance, adhesion, thermal resistance, etc.

[0006]

[Means for Solving the Problem] That this invention person should solve said technical problem, as a result of repeating examination wholeheartedly, it came to complete a header and this invention for the coating constituent corresponding to said purpose being obtained by using the resin constituent which makes an indispensable constituent the organic inorganic hybrid material which comes to denaturalize with a specific inorganic material in a specific epoxy resin.

[0007] That is, this invention relates to the coating constituent characterized by consisting of a curing agent for an alkoxy group content silane modified epoxy resin (A), a bisphenol mold epoxy resin (B), and epoxy resins (C) which is made to carry out the dealcoholization reaction of a bisphenol mold epoxy resin (1) and the alkoxysilane partial condensate (2), and is obtained.

[0008]

[Embodiment of the Invention] The alkoxy group content silane modified epoxy resin (A) used by this invention consists of a bisphenol mold epoxy resin (1) and an alkoxysilane partial condensate (2) as above-mentioned. The bisphenol mold epoxy resin (1) concerned is obtained by the reaction with halo epoxide, such as bisphenols, epichlorohydrin, or beta-methyl epichlorohydrin. What is obtained as bisphenols by the etherification reaction of oxidation by the peroxy acid of a dihydroxy phenyl sulfide besides the reactant of a phenol or 2, and 6-dihalo phenol, and an aldehydes, such as formaldehyde, an acetaldehyde, an acetone, an acetophenone, a cyclohexanone, and a benzophenone, or ketones and hydroquinone etc. is raised.

[0009] Moreover, a bisphenol mold epoxy resin (1) has the hydroxyl group which can carry out a dealcoholization reaction with an alkoxysilane partial condensate (2). It is necessary to contain the hydroxyl group concerned in no molecules which constitute a bisphenol mold epoxy resin (1), and it should just have the hydroxyl group as a bisphenol mold epoxy resin (1). Although the weight per epoxy equivalent of a bisphenol mold epoxy resin (1) can use the thing of suitable weight per epoxy equivalent according to an application, choosing it suitably since it changes with structures of a bisphenol mold epoxy resin (1), that 180 or more g/eq [1500 or less] of whose weight

per epoxy equivalent is generally 230 or more g/eq [1000 or less] more preferably is suitable for it. Also in these bisphenols mold epoxy resin (1), especially the bisphenol A mold epoxy resin is most used widely, is a low price, and desirable.

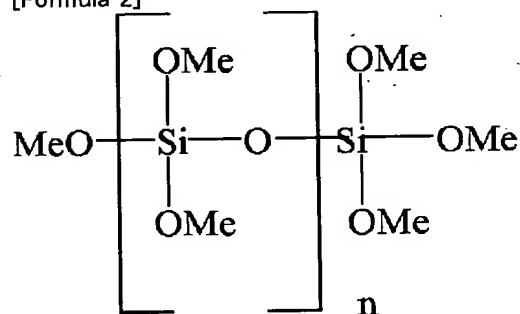
[0010] Moreover, the oligomer which hydrolyzed partially and condensed the alkoxysilane generally used for the sol-gel method as an alkoxysilane partial condensate (2) which constitutes an alkoxy content silane modified epoxy resin (A) can be used. For example, general formula: $R_1pSi(OR_2)_{4-p}$ (p shows the integer of 0 or 1 among a formula.) R1 shows the low-grade alkyl group which may have a functional group linking directly to a carbon atom, an aryl group, or partial saturation aliphatic series residue, and even if respectively the same, it may differ. Moreover, R2 shows a hydrogen atom or a low-grade alkyl group. The partial condensate of the compound expressed etc. can be illustrated. As the above-mentioned functional group, a vinyl group, a sulfhydryl group, an epoxy group, a glycidoxy radical, etc. can be mentioned, for example. Moreover, a low-grade alkyl group shows the alkyl group of a with a carbon number of six or less straight chain or branched chain. In addition, since three-dimension bridge formation will not take place when p is 2-4, it becomes impossible to give desired high thermal resistance to the coating constituent finally obtained, and is not desirable.

[0011] As an example of such an alkoxysilane partial condensate (2) A tetramethoxy silane, a tetra-ethoxy silane, tetra-propoxysilane, The partial condensate of tetra-alkoxysilane, such as tetra-isopropoxysilane and tetra-butoxysilane; Methyl trimethoxysilane, Methyl triethoxysilane, a methyl tripropoxy silane, MECHIRUTORI butoxysilane, Ethyl trimethoxysilane, ethyltriethoxysilane, n-propyltrimethoxysilane, n-propyl triethoxysilane, isopropyl trimethoxy silane, Isopropyl triethoxy silane, vinyltrimethoxysilane, vinyltriethoxysilane, 3-glycidoxypropyltrimethoxysilane, 3-glycidoxypropyltriethoxysilane, 3-mercapto propyltrimethoxysilane, 3-mercapto propyl triethoxysilane, The partial condensate of trialkoxysilane, such as phenyl trimethoxysilane, phenyl triethoxysilane, 3, 4-epoxycyclohexyl ethyl trimethoxysilane, 3, and 4-epoxycyclohexyl ethyl trimethoxysilane, is raised. Partial condensates, such as a tetramethoxy silane and methyl trimethoxysilane, etc. are desirable also in these. In addition, when using the partial condensate of trialkoxysilane, it is usually desirable as an alkoxysilane partial condensate (2), although the thing of said instantiation can be especially used without a limit among alkoxysilane partial condensates (2) 40 or less % of the weight of for it to be comparatively alike and to use together with the partial condensate of tetra-alkoxysilane.

[0012] Although an alkoxysilane partial condensate (2) should just choose suitably one sort or two sorts or more from the above-mentioned matter, it is [the average number of Si per molecule] desirable that it is 2-100. In case it is a dealcoholization reaction with a bisphenol mold epoxy resin (1) as the average number of Si is less than two, since the amount of the poisonous alkoxysilane which flows out out of a system together with byproduction alcohol increases, it is not desirable. Moreover, if 100 is exceeded, reactivity with a bisphenol mold epoxy resin (1) will fall, and the alkoxy group content silane modified epoxy resin (A) made into the purpose will be hard to be obtained. If acquisition ease, such as a commercial item, is taken into consideration, let the average number of Si per molecule be about three to 20 thing.

[0013] Especially, it is a general formula. : [0014]

[Formula 2]



[0015] The partial condensate of the tetramethoxy silane expressed with (Me shows a methyl group among a formula and the average repeat numbers of unit of n are 1-7) is desirable. Moreover, as for the number average molecular weight of the partial condensate concerned, 260 to about 1200 are desirable. In a demethanol reaction, the poisonous tetramethoxy silane which may flow out system outside with a byproduction methanol hardly exists, but the partial condensate concerned has it also from the point of reaction actuation or insurance health.

[desirable]

[0016] The alkoxy group content silane modified epoxy resin (A) used by this invention is obtained by said bisphenol mold epoxy resin (1) and the dealcoholization reaction with an alkoxysilane partial condensate (2). Although the operating rate of a bisphenol mold epoxy resin (1) and an alkoxysilane partial condensate (2) will not be restricted into the alkoxy group content silane modified epoxy resin (A) obtained especially if it is a rate in which an alkoxy group remains, it is desirable that the range of the weight (weight ratio) of the silica equivalent weight / bisphenol mold epoxy resin (1) of an alkoxysilane partial condensate (2) is 0.01-3. Moreover, as an operating rate of a bisphenol mold epoxy resin (1) and an alkoxysilane partial condensate (2), it is desirable that it is the range of 1 / 30 - 1/3 in the equivalent (equivalent ratio) of the alkoxy group of the equivalent / alkoxysilane partial condensate (2) of the hydroxyl group of a bisphenol mold epoxy resin (1).

[0017] Manufacture of this alkoxy group content silane modified epoxy resin (A) is performed by carrying out a dealcoholization reaction, distilling off the alcohol which teaches, heats and carries out the byproduction of for

example, a bisphenol mold epoxy resin (1) and the alkoxysilane partial condensate (2). About 50–130 degrees C of reaction temperature are 70–110 degrees C preferably, and overall reaction time amount is about 1 – 15 hours. As for this reaction, it is desirable to carry out under anhydrous conditions substantially in order to prevent the polycondensation reaction of the alkoxysilane partial condensate (2) itself.

[0018] Moreover, on the occasion of the above-mentioned dealcoholization reaction, what does not carry out ring breakage of the epoxy ring among well-known catalysts conventionally for promotion of a reaction can be used. As this catalyst, a lithium, sodium, a potassium, a rubidium, caesium, magnesium, calcium, barium, strontium, zinc, aluminum, titanium, cobalt, germanium, tin, lead, antimony, arsenic, a cerium, boron, cadmium, an oxide of metal; these metals like manganese, an organic-acid salt, a halogenide, an alkoxide, etc. are raised, for example. Also in these, organic tin and organic-acid tin are especially desirable, and, specifically, a dibutyl tin JIRAU rate, tin octylate, etc. are effective.

[0019] Moreover, a non-solvent can also perform the above-mentioned reaction among a solvent. As a solvent, a bisphenol mold epoxy resin (1) and an alkoxysilane partial condensate (2) are dissolved, and to these, if it is the organic solvent which is non-activity, there will be especially no limit. As such an organic solvent, aprotic polar solvents, such as cellosolve systems, such as aromatic series systems, such as ester systems, such as ketone systems, such as a methyl ethyl ketone, MIBK, a cyclohexanone, and an isophorone, ethyl acetate, and butyl acetate, toluene, and a xylene, a cellosolve acetate, methyl-cellosolve acetate, and dimethyl diethylene glycol, can be illustrated, for example.

[0020] In this way, although the hydroxyl group in a bisphenol mold epoxy resin (1) uses as a principal component the epoxy resin which comes to carry out silane denaturation, in the alkoxy group content silane modified epoxy resin (A) concerned, the unreacted bisphenol mold epoxy resin (1) and the unreacted alkoxysilane partial condensate (2) may contain the obtained alkoxy group content silane modified epoxy resin (A).

[0021] The alkoxy group content silane modified epoxy resin (A) has the alkoxy group originating in an alkoxysilane partial condensate (2) in the molecule. this alkoxy group — evaporation and heat-treatment of a solvent — or the hardened material combined mutually is formed by the reaction with moisture (moisture). This hardened material has the gelled detailed silica part (high order network structure of siloxane association). Therefore, as for the alkoxy group contained in an alkoxy group content silane modified epoxy resin (A), it is desirable to hold more than 60 mol % of the alkoxy group of the used alkoxysilane partial condensate (2).

[0022] As a bisphenol mold epoxy resin (B) used for this invention Said bisphenol mold epoxy resin (1), polyglycidyl ether of o-cresol-form aldehyde novolac, Novolak mold epoxy resins, such as a phenol novolak mold epoxy resin; A phthalic acid, The glycidyl ester mold epoxy resin which polybasic acid and epichlorohydrin, such as dimer acid, are made to react, and is obtained; Diamino diphenylmethane, the line oxidized and obtained by peroxy acids, such as a peracetic acid, in glycidyl amine mold epoxy resin; olefin association which polyamine and epichlorohydrin, such as isocyanuric acid, are made to react and is obtained — an aliphatic series epoxy resin, cycloaliphatic epoxy resin, etc. are raised. Among the above-mentioned bisphenol mold epoxy resins (B), the bisphenol A mold epoxy resin is desirable still more desirable, and the weight per epoxy equivalent concerned is the thing of 180 – 2200 g/eq.

[0023] Moreover, as a curing agent for epoxy resins (C), the phenol resin system curing agent currently used as a curing agent of an epoxy resin, a polyamine system curing agent, a polycarboxylic acid system curing agent, etc. can usually be especially used without a limit. Specifically as a phenol resin system curing agent Phenol novolak resin, bisphenol novolak resin, a Pori p-vinyl phenol, etc. are raised. As a polyamine system curing agent, diethylenetriamine, triethylenetetramine, Tetraethylenepentamine, a dicyandiamide, a polyamide amine (polyamide resin), A ketimine compound, isophorone diamine, meta xylene diamine, m-phenylenediamine, 1,3-screw (aminomethyl) cyclohexane, N-aminoethyl piperazine, The 4 and 4'-diamino diphenylmethane, 4, and 4'-diamino -3, 3'-diethyl diphenylmethane, Diamino diphenyl sulfone etc. is raised. As a polycarboxylic acid system curing agent Phthalic anhydride, tetrahydro phthalic anhydride, methyl-cyclohexene-dicarboxylic-anhydride, 3, and 6- and methylene tetrahydro phthalic anhydride, hexa KURORUENDO methylene tetrahydro phthalic anhydride, methyl -3, 6-, and methylene tetrahydro phthalic anhydride are raised.

[0024] It reacts with an epoxy ring and the above-mentioned curing agent for epoxy resins (C) not only carries out ring breakage hardening, but serves as a catalyst over the reaction in which the alkoxy silyl part and alkoxy group in a silane modified epoxy resin (A) carry out siloxane condensation mutually. Also in the above-mentioned curing agent for epoxy resins (C), a polyamine system curing agent is the optimal as a curing catalyst of an alkoxy silyl part or an alkoxy group. Since a coating constituent with comparatively long pot life is obtained when at least one sort chosen from the group which consists of an acid anhydride, a polyamide, and ketimine among the curing agents for epoxy resins concerned (C) is used, it is useful as a 1 liquid hardening mold coating agent. When it is at least one sort chosen from the group which consists of polyamine and phenol resin as a curing agent for epoxy resins (C) on the other hand, the coating constituent obtained can be used as a 2 liquid hardening mold coating agent.

[0025] In the coating constituent of this invention, although a solvent (D) is made into an arbitration constituent, the solvent (D) concerned is used for viscosity control according to the application of a coating agent. Usually, it is desirable that B mold viscosity in 25 degrees C is 400 – 2000 mPa·s. As a solvent (D), solvents, such as alcohols, such as cellosolve systems, such as aromatic series systems, such as ester systems, such as ketone systems, such as a methyl ethyl ketone, MIBK, a cyclohexanone, and an isophorone, ethyl acetate, and butyl acetate, toluene, and a xylene, a cellosolve acetate, methyl-cellosolve acetate, and dimethyl diethylene glycol, isopropyl alcohol, and n-butyl alcohol, can be illustrated.

[0026] In the coating constituent of this invention, although a filler (E) is made into an arbitration constituent, the

filler (E) concerned is blended in order to raise the abrasion resistance of a coating constituent, and rust-proofing nature. Although especially the class of filler (E) is not limited; rust preventive pigments, such as extenders, such as color pigments, such as a titanium white used for a common coating, Synthetic Ochre, and carbon black, a silica, talc, and sedimentation nature barium, a zinc white, and an aluminium phosphate system, etc. can be used.

[0027] In the coating constituent of this invention, the curing agent for the alkoxy group content silane modified epoxy resin (A) which are the various above constituents, i.e., an indispensable constituent, a bisphenol mold epoxy resin (B), and epoxy resins (C) and the solvent (D) which is an arbitration constituent, and/or a filler (E) are blended, and it is prepared.

[0028] Although especially limitation is not carried out, as for the blending ratio of coal of these constituents, it is desirable that it is the following rate. The amount of the bisphenol mold epoxy resin (B) used is the 50 - 500 weight section to the hardening residue 100 weight section of an alkoxy group content silane modified epoxy resin (A). Here, the hardening residue of an alkoxy group content silane modified epoxy resin (A) is called for as follows. That is, the triethylenetetramine of the equivalent is mixed with an alkoxy group content silane modified epoxy resin (A), continue about 1g by **** picking (measuring **), and continue this at 100 degrees C for 1 hour, and dry, an aluminum cup (diameter of 50mm) is made to harden the mixed liquor concerned at 200 degrees C for 1 hour, re-measuring (measuring **) is carried out, and it computes from a bottom type. Hardening residue = (weight of measuring ** - triethylenetetramine) / measuring ** x 100 [0029] Although it can adjust suitably according to the application of a coating constituent as long as the blending ratio of coal of an alkoxy group content silane modified epoxy resin (A) and the bisphenol A mold epoxy resin (B) is within the limits of the above, it is still more desirable to blend both so that the silica equivalent weight in the hardened material obtained from a coating constituent may become 3 - 30% of the weight. Silica equivalent weight means the weight of the silica which carries out the sol-gel hardening reaction of the alkoxy silane partial condensate (2) used for the alkoxy group content silane modified epoxy resin (A) contained in a coating constituent, and is obtained here.

[0030] As for the blending ratio of coal of an alkoxy group content silane modified epoxy resin (A) and the curing agent for epoxy resins (C), it is desirable that it is the range whose functional group which has active hydrogen in the curing agent for epoxy resins (C) to 1Eq of epoxy groups originating in an alkoxy group content silane modified epoxy resin (A) and a bisphenol mold epoxy resin (B) is 0.5-1.2Eq.

[0031] Moreover, the amount of the filler (E) used is the 0 - 500 weight section to the hardening residue 100 weight section of an alkoxy group content silane modified epoxy resin (A).

[0032] Moreover, in said epoxy resin constituent, the hardening accelerator for promoting the hardening reaction of an epoxy resin and a curing agent can be contained. For example, 1 and 8-diazabicyclo [5.4.0] undecene -7, triethylenediamine, Benzyl dimethylamine, triethanolamine, dimethylamino ethanol, The third class amines, such as a tris (dimethyl aminomethyl) phenol; 2-methylimidazole, 2-phenylimidazole, 2-phenyl-4-methylimidazole, Imidazole derivatives, such as 2-heptadecylimidazole; Tributyl phosphine, Methyl diphenylphosphine, triphenyl phosphine, diphenylphosphine, Organic phosphines, such as a phenyl phosphine; Tetra-phenyl phosphonium tetraphenyl borate, Tetraphenylboron salts, such as 2-ethyl-4-methylimidazole tetraphenyl borate and N-methyl morpholine tetraphenyl borate, etc. can be raised. As for a hardening accelerator, it is desirable to use it at a rate of 0.1 - 5 weight section to the 100 weight sections of an epoxy resin.

[0033] A bulking agent, a release agent, a finishing agent, a flame retarder, a viscosity modifier, a plasticizer, an antimicrobial agent, an antifungal agent, a leveling agent, a defoaming agent, a coloring agent, a stabilizer, a coupling agent, etc. may be blended with the coating constituent of this invention in the range which does not spoil the effectiveness of this invention if needed. The coating constituent of this invention obtained as mentioned above is a high degree of hardness, and is about F-6H as a pencil degree of hardness. Moreover, although viscosity can be suitably determined according to an application or workability, it is good to usually consider as 100 - 10000 mPa-s extent as B mold viscosity in 25 degrees C.

[0034]

[Effect of the Invention] It is a high degree of hardness, and the coating constituent of this invention is excellent in abrasion resistance, adhesion, thermal resistance, etc., and is especially suitable to an inorganic base material or a nonferrous metal base material. The coating constituent of this invention is suitable for various applications, such as for example, 1 liquid or 2 liquid type primer, a sealing agent, and adhesives. The object for prizes can be especially carried out to the printing mold for the primer for inorganic base materials, and inorganic base materials or 1 liquid hardening mold coating of ordinary temperature latency, and 2 liquid hardening mold coating for inorganic base materials.

[0035]

[Example] Hereafter, an example and the example of a comparison are given and this invention is explained concretely. In addition, among each example, % is weight criteria, as long as he has no special mention.

[0036] The example 1 (manufacture of an alkoxy group content silane modified epoxy resin) of manufacture 640g [of the bisphenol A mold epoxy resins] (Tohto Kasei Co., Ltd. make, trade name "EPO TOTO YD-011", weight-per-epoxy-equivalent 475 g/eq) and methyl-isobutyl-ketone 1000g was added to the reactor equipped with the agitator, the cooling pipe, the thermometer, and the nitrogen entrainment plug, and it dissolved in it at 90 degrees C. Furthermore, dibutyl tin JIRAU rate 2g was added as 521.3g (the product made from Tama Chemistry, trade name "methyl silicate 51") of tetramethoxy silane partial condensates, and a catalyst, the demethanol reaction was carried out at 90 degrees C for 6 hours, and the alkoxy group content silane modified epoxy resin solution was obtained. At, in addition, the time of preparation = (weight of the silica equivalent weight / epoxy resin

(1) of an alkoxysilane partial condensate (2)) it is 0.42 and is $\frac{\text{equivalent of methoxy group}}{\text{equivalent of alkoxysilane partial condensate (2) of hydroxyl group of bisphenol mold epoxy resin (1)}}$ 1/7.6. From $^1\text{H-NMR}$ (CDCl_3 solution) measurement result of this resin solution, it has checked that the methine peak (near 3.3 ppm) of an epoxy ring is held 100%, and that the peak (near 3.85 ppm) of the hydroxyl group in an epoxy resin was decreasing about 50%. The hardening residue of the obtained alkoxy group content silane modified epoxy resin solution is 40.8%, and the weight per epoxy equivalent of this resin solution is 1600. More than is indicated to be the weight per epoxy equivalent of the resin solution concerned in g of this solution per one mol of epoxy groups here (it is below the same).

[0037] The example 2 (manufacture of an alkoxy group content silane modified epoxy resin) of manufacture 450g and methyl-isobutyl-ketone 1100g were added to the same reactor as the example 1 of manufacture, and EPO TOTO YD-011 were dissolved in it at 90 degrees C. Furthermore, methyl silicate 51 (1206. eight g) and dibutyl tin JIRAU rate 2g was added, and the demethanol reaction was carried out at 90 degrees C for 5 hours. Then, it cooled to 50 degrees C, the nitrogen entrainment plug and the Bunsui machine were removed, reduced pressure Rhine was connected, reduced pressure removal of methanol and methyl-isobutyl-ketone a total of 500g which remains in about 15 minutes and in a system by 10kPa was carried out, and the alkoxy group content silane modified epoxy resin solution was obtained. At in addition, the time of preparation = $\frac{\text{weight of the silica equivalent weight}}{\text{bisphenol mold epoxy resin (1) of an alkoxysilane partial condensate (2)}}$ it is 1.37, and $\frac{\text{equivalent of methoxy group of equivalent / alkoxysilane partial condensate (2) of hydroxyl group of bisphenol mold epoxy resin (1)}}$ 1/25. From $^1\text{H-NMR}$ (CDCl_3 solution) measurement result of this resin solution, it has checked that the methine peak (near 3.3 ppm) of an epoxy ring is held 100%, and that the peak (near 3.85 ppm) of the hydroxyl group in an epoxy resin had disappeared. The hardening residue of the obtained alkoxy group content silane modified epoxy resin solution is 50.3%, and the weight per epoxy equivalent of the resin solution concerned is 2300 g/eq.

[0038] The example 3 (manufacture of an alkoxy group content silane modified epoxy resin) of manufacture EPO TOTO YD-011 (400g) and 600g (the Tohto Kasei Co., Ltd. make, a trade name "YD-127", weight-per-epoxy-equivalent 185 g/eq) of the liquefied bisphenol A mold epoxy resins were added to the same reactor as the example 2 of manufacture, and it dissolved in it at 90 degrees C. Furthermore, methyl silicate 51 (1072. seven g) and dibutyl tin JIRAU rate 2g was added, and the demethanol reaction was carried out at 90 degrees C for 6 hours. Then, it cooled to 50 degrees C, the nitrogen entrainment plug and the Bunsui machine were removed after cooling at 50 degrees C, reduced pressure Rhine was connected, reduced pressure removal of the methanol which remains in about 15 minutes and in a system by 10kPa was carried out, and the alkoxy group content silane modified epoxy resin solution was obtained. At in addition, the time of preparation = $\frac{\text{weight of the silica equivalent weight}}{\text{bisphenol mold epoxy resin (1) of an alkoxysilane partial condensate (2)}}$ it is 0.55, and $\frac{\text{equivalent of methoxy group of the equivalent / alkoxysilane partial condensate (2) of the hydroxyl group of a bisphenol mold epoxy resin (1)}}$ 1/20. From $^1\text{H-NMR}$ (CDCl_3 solution) measurement result of this resin solution, it has checked that the methine peak (near 3.3 ppm) of an epoxy ring is held 100%, and that the peak (near 3.85 ppm) of the hydroxyl group in an epoxy resin had disappeared. The hardening residue of the obtained alkoxy group content silane modified epoxy resin solution is 75.2%, and the weight per epoxy equivalent of the resin solution concerned is 500 g/eq.

[0039] Example of comparison manufacture 1 EPO TOTO YD-011 were dissolved in dimethylformamide, and it considered as 40% of nonvolatile matters, and the epoxy resin solution of weight per epoxy equivalent 1200.

[0040] What mixed EPO TOTO YD-127 with example of comparison manufacture 2 EPO TOTO YD-011 by the weight ratio 2:3 was dissolved in dimethylformamide, and it considered as 40% of nonvolatile matters, and the epoxy resin solution of weight per epoxy equivalent 360.

[0041] 640g and methyl silicate 51 (521.3g) were blended, and example of comparison manufacture 3 EPO TOTO YD-011 (640g) and methyl isobutyl ketone were used as 50% of nonvolatile matters, and the epoxy resin-alkoxysilane resin solution of weight per epoxy equivalent 1300.

[0042] Example of comparison manufacture 4 EPO TOTO YD-011 (450g) and methyl-isobutyl-ketone 450g and methyl silicate 51 (1206. eight g) were blended, and it considered as 50% of nonvolatile matters, and the epoxy resin-alkoxysilane resin solution of weight per epoxy equivalent 2200.

[0043] It mixed with loadings as show an alkoxy group content silane modified epoxy resin (A), the (each aforementioned resin solution), a bisphenol mold epoxy resin (B) and (50% methyl-isobutyl-ketone solution of the bisphenol A mold epoxy resin (trade name "YD-011" by Tohto Kasei Co., Ltd.), the curing agent for epoxy resins (C) and (the amino polyamide resin (trade name "good MAIDO G-725" by Tohto Kasei Co., Ltd.), and a solvent (methyl isobutyl ketone) in the 1st table, and each preparation varnish was obtained. In addition, the sum total equivalent of an originating [the amount of the curing agent for epoxy resins used in the 1st table (C)]-in equivalent / alkoxy group content silane modified epoxy resin (A), and epoxy resin (B) of functional group (amino group) which have active hydrogen in curing agent (C) concerned epoxy group = it becomes 0.9/1. Moreover, solid content of the hardening residue / epoxy resin (B) solution of each resin solution which is an alkoxy group content silane modified epoxy resin (A) = they are 1/1 of rates.

[0044]

[Table 1]

調製フニ スの種類	アルコキシ基含有シリ 変性エポキシ樹脂 (A)溶液の使用量		ビスフェノール A 型エポキシ 樹脂 (B) の使用量		エポキシ樹 脂用硬化 剤 (C) の 使用量		溶剤の 使用量
	種類	使用量	の使用量		の使用量		
(a 1)	製造例 1	50	40		17.2		0.8
(a 2)	製造例 2	50	50		17.4		13.0
(a 3)	製造例 3	50	75		41.9		18.5
(b 1)	比較例 1	50	40		19.6		1.1
(b 2)	比較例 2	50	40		42.4		3.6
(b 3)	比較例 3	50	50		21.3		13.5
(b 4)	比較例 4	50	50		17.6		13.1

Each unit of the numeric value of front Naka is the weight section.

[0045] (Preparation of a coating constituent and the trial version) Each above-mentioned adjustment varnish (50% of nonvolatile matters) and the above-mentioned following filler were kneaded with the paint shaker, and the coating constituent was prepared (the obtained coating constituent calls the thing (examples 1-3) of this invention constituent A-C in order, and calls the thing for a comparison (examples 1-4 of a comparison) constituent a-d in order). These coating constituents were applied so that it might become 20 micrometers of thickness, respectively on a glass plate (3202 to JIS R85 conformity), mortar (5201 to JIS R92 conformity), and an aluminum plate (JIS H4000 A1050P), and it dried for 20 minutes at 130 degrees C, and the test panel was created.

[0046]

(Coating constituent)

Each adjustment liquid (45% solution of hardening residues) Section [90 /] Synthetic Ochre (TAROXLL-XLO: Titan Kogyo K.K. Make) Eight Sections K-White (#82: Teikoku Kako CO., LTD. Make) Six Sections Talc (Crown Talc SC: Product made from Tsuchiya Kaolin Industry) Ten Sections Calcium Carbonate (Super SSS: Maruo Calcium Co., Ltd. Make) 16 Sections Dilution Solvent (MIBK) 30 Sections [0047] The following approaches estimated the coat engine performance using the test panel obtained above. An evaluation result is shown in the 2nd table.

(1) Pencil degree of hardness JIS It was based on K-5400.

(2) Adhesion JIS The grid cellophane tape friction test based on K-5400 was performed, and it judged on the following criteria.

O : 100/100 100** : [O : (99-95) / (94-70)/100 Adhesion was evaluated after leaving each test panel created by x: (69-0) / 100(3) thermal-resistance above at 150 degrees C for 8 hours. The evaluation approach of adhesion is the same as that of the above (2).

[0048]

[Table 2]

	使用調製 フニス	コーティング 組成物	鉛筆 硬度	密着性			耐熱性		
				①	②	③	①	②	③
実施例 1	a 1	組成物 A	3 H	◎	◎	◎	◎	◎	◎
実施例 2	a 2	組成物 B	4 H	◎	◎	◎	◎	◎	◎
実施例 3	a 3	組成物 C	3 H	◎	◎	◎	◎	◎	◎
比較例 1	b 1	組成物 a	2 H	△	△	○	△	×	○
比較例 2	b 2	組成物 b	H	○	△	○	△	×	△
比較例 3	b 3	組成物 c	2 H	○	○	○	○	△	○
比較例 4	b 4	組成物 d	2 H	○	○	○	○	△	○

[0049] In front Naka, adhesion, and a heat-resistant item, in **, a glass plate and ** say a mortar plate and ** says an aluminum plate.

[0050] The hardening coat which becomes using the coating constituent of this invention is a high degree of hardness, and it turns out that it excels in the adhesion over an inorganic base material or a nonferrous metal base material, or thermal resistance so that clearly also from the 2nd table.

[Translation done.]